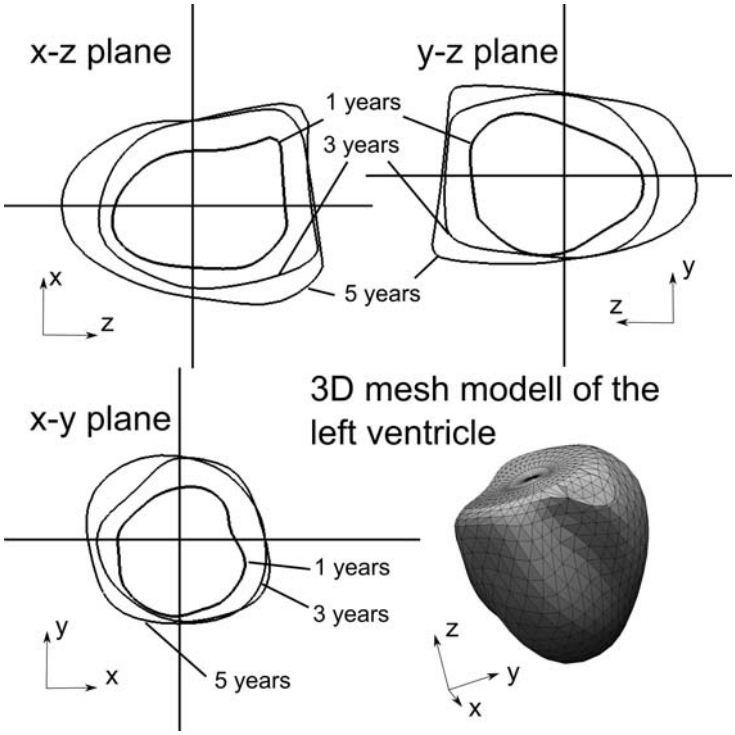
P-78

A case study: Description of the LV growth process in children with aortic stenosis based on 4D-Realtime Echocardiography

Wolf A., Winkler C., Herberg U. Breuer J., Linden K.
University of Bonn, Germany

Introduction: For the examination of left ventricular (LV) volume 4D-Realtime (4DRT) Echocardiography has been established as a safe and accurate method. In current literature, a serial long-term follow up study about the growth of the LV of children with congenital heart disease assessed by 4DRT Echo is missing. Furthermore, the current scientific approach evaluates fixed parameters such as EDV and ESV, but neglects temporal changes as well as the spatial structure of the LV. In our case study, we describe the LV growth of patients with aortic stenosis based on serial measurements. This case report illustrates a new approach for the assessment of data obtained by 4DRT, which will help to define the anatomy and evaluate the heart function.



Methods: 4DRT datasets of one patient with aortic stenosis were serially obtained using ie33 (Philips; X7-2 matrix transducer), starting from the first postnatal preinterventional echo until 7 years. Data were analysed using ImageArena 4.6 (TomTec) and the including tool 4D LV-Analysis 3.1. Surface models of the dynamic left ventricular volume changes were exported and used for a mathematical analysis. To visualize and assess the changes of the 3D structure of the surface models, the open source software ParaView was chosen.

Results: To illustrate serial changes of LV function and size, we compared the surface models for the enddiastolic volume of one patient for three ages (1,3 and 5 years) by plotting the contours as multiview orthographic projections. The figure shows 2D plots of different section planes and the 3D surface model for the first measurement. The contours reveal how the LV size changed over the time. Furthermore, we can detect regions of interest which show a very rapid or slow change. If compared to reference data, we can confer the diseased left ventricle with given reference mesh models.

Conclusions: In this study, we illustrated the complex changes of ventricular geometry in children with critical aortic stenosis during follow up. The derived knowledge is crucial to examine and understand the pathological growth process. This may result in a prospective estimation of longitudinal left ventricular growth and function and therefore therapeutic decision making.